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Case report

Traumatic displacement of stomach – A case report

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ABSTRACT

These days we have fast paced traffic on our roads to help us keep up with our fast paced life. But every boon has a down side and our high velocity traffic is no exception. Here is a case report of a blunt abdominal injury following a road traffic accident. Externally the deceased had only a few grazed abrasions on the forehead and right forearm. But on internal examination of abdomen, it was noticed that the left hemi-diaphragm was torn and the stomach and intestines were found displaced into the left thoracic cavity.

1. Introduction

Thoraco-abdominal injuries are on the rise, lately, due to high velocity road traffic accidents.[1] Rupture of the diaphragm is a frequent consequence in traffic accidents in which a blunt trauma to the abdomen causes a sudden rise of the intra abdominal pressure. Several studies have shown that in diaphragmatic injuries, the left hemidiaphragm is more commonly involved.[2] The incidence of diaphragmatic rupture with visceral herniation is 0.8–5%, and it is a well described complication of blunt thoracoabdominal trauma.[3] In most cases the herniated organ is the stomach, the spleen, or part of the small or large intestine. Herniation of the liver or other parts of abdominal contents occur more rarely.[4] Studies have shown that because of the large force required to rupture diaphragm, multi system injuries are usually noted in these cases.[6,7] The following case shows an instance where blunt thoracoabdominal injury has caused rupture of diaphragm with herniation of stomach into the thoracic cavity but with very less external injury and no injury to any other organ systems.

2. Case report

On the evening of 7-7-2012, the deceased was walking back from his work, when he met with a road traffic accident. The broad front part (41 inches above ground level) of a three-wheeled motor vehicle, commonly seen on Indian roads known as auto rickshaw (as shown in Fig. 1) hit the deceased on the upper part of abdomen on left side (41 inches above ground level; 41 inches – 2 inches in case the brake is applied) and knocked him down. He succumbed to the injuries within 10–15 min of the incident on the way to the hospital.

At autopsy, the body was found to be of an adult male, moderately built and nourished, measuring 165 cm in length and weighing 48 kg in weight. External examination of the body revealed a few grazed abrasions of varying sizes on face and right upper limb with no injuries on the abdomen (as shown in Figs. 2 and 3).

On internal examination, the body of the sternum was fractured at the junction of upper one-third and lower two-third. On removal of the sternum we found that the right pleural cavity contained around 300 ml and left pleural cavity contained around 100 ml of

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Fig: 1. 41 inches from ground level.

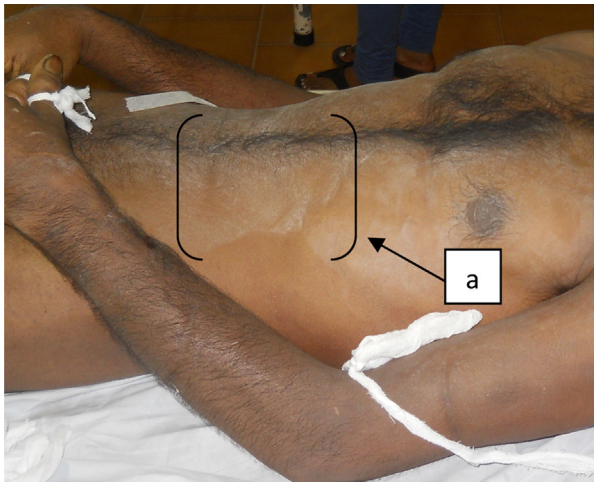

Fig: 3. *a – the area on upper part of abdomen on the left side which was 41 inches above the ground level.

bloodstained fluid. The 7th rib on the left side was fractured along the anterior axillary line and there was associated contusion of the intercostal muscles, along the lateral aspect of inner chest wall. The left hemidiaphragm was found torn and tags of diaphragm along with the stomach and intestines were seen in the left side of the pleural cavity (as shown in Fig. 4). Left lung was collapsed and cut section of both the lungs showed signs of congestion. Stomach weighed 330 g and it contained partially digested food particles. Mucosa of the stomach was intact and healthy. Detailed examination of the remaining organs revealed no significant findings.

3. Discussion

Traumatic diaphragm rupture was first described by Sennertus in 1541.[1,4,5] Diaphragmatic injury is a well documented outcome of high velocity blunt and penetrating trauma to the abdomen and chest.[2] There is no general consensus on the matter as to whether it is thoracic or abdominal trauma that results in diaphragmatic rupture.[6] A study conducted by Wise and associates showed that in blunt diaphragmatic injuries, the impact of trauma was twice as common in the abdomen than in the chest.[7] Ebert and associates, on the other hand, suggested that diaphragmatic rupture occurs more often after thoracic trauma than after abdominal trauma.[8] In all such cases patients usually have multi system injuries because of the large force required to rupture the diaphragm.[5] The weakest point of the diaphragm is the left postero-lateral area along the embryonic fusion lines of the pleuroperitoneal membrane and so this is the most common site for diaphragm rupture.[4] However, recent studies have shown that diaphragmatic rupture can occur in all areas of the diaphragm.[9] Earlier, right-sided diaphragmatic ruptures were reported rarely,[10] but owing to innovative diagnostic techniques of modern era, traumatic diaphragmatic rupture of the right side is also being more frequently detected.

The accepted mechanisms of rupture usually include a sudden increase in intra-abdominal pressure throughout the abdomen with the relatively weak, unprotected left diaphragm tearing because of that force, or avulsion of the attachments of the diaphragm or shearing of the stretched diaphragmatic membrane after right or left lateral impact, or the fragments of rib fracture directly penetrating the diaphragm wall.[4] The cases in which large amount of force is involved in the disruption of diaphragm, trauma to the liver, kidneys, and spleen should always be considered in conjunction with diaphragmatic rupture. But in the present case except for stomach which had herniated into the thoracic cavity, all the other organs were intact. Internal examination of the body revealed fracture of sternum, ribs, and contusions of intercostals

Fig: 2. Body of the deceased.

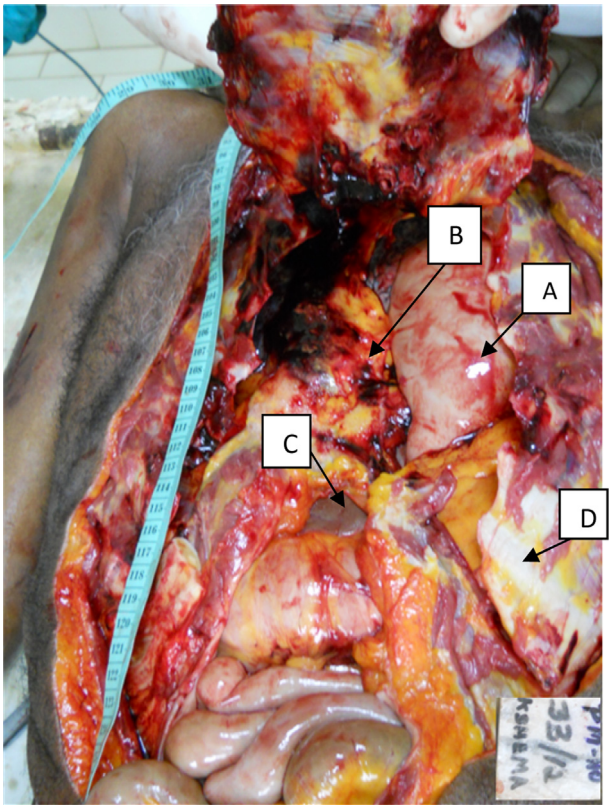

Fig: 4. *A – displaced stomach, B – heart, C – liver, D – chest wall.

muscles suggestive of a significant external blunt force which failed to register a marked external injury. This may be because of the fact that when the deceased was hit by the broad front surface of the vehicle (as shown in Fig. 1), the force of impact was spread across the entire surface area of the abdomen and thereby precluding the localization of force sufficient enough to produce an external injury.

Diaphragmatic injuries remain a diagnostic challenge for both radiologists and surgeons. In most cases, the diagnosis may be obvious at chest radiography and computed tomography (CT); however, some specific cases require careful analysis with magnetic resonance (MR) imaging.[11] It is ironic that many groups point to the usefulness of diaphragmatic injury as a marker of severity of injuries sustained while, at the same time, demonstrating the ease with which it can be missed.[5] The high frequency of associated injuries combined with the 70% chance of missing the diagnosis on a routine chest radiograph point to the need of a high index of suspicion to avoid the consequence of missed injuries.[5] Optimal treatment consists of early repair through an abdominal approach with careful attention given to associated injuries as the outcome is dependent almost entirely on the severity of these associated injuries.[5]

4. Conclusion

This case is a rare instance where traumatic diaphragmatic rupture with herniation has presented without significant external injuries or damage to other internal organs. This necessitates a careful assessment, examination and management of trauma cases, as there could be a possibility of inconspicuous complications of thoraco-abdominal blunt force involved therein.

Ethical approval
None declared.

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Conflict of interest
Authors have no conflict of interest in this case report.

References

1. Mihos P, Potaris K, Gakidis J, Panagiotis V, Gougoutas B, Papadakis G. Traumatic rupture of the diaphragm: experience with 65 patients. *Injury* 2003;**3**:169–72.
2. Goh BK, Wong AS, Tay KH, Hoe MN. Delayed presentation of a patient with a ruptured diaphragm complicated by gastric incarceration and perforation after apparently minor blunt trauma. *Can J Emerg Med* 2004;**6**(4):277–80.
3. Rossetti G, Brusciano L, Maffetone V, Napolitano V, Sciaudone G, DelGenio G, et al. Giant right post-traumatic diaphragmatic hernia: laparoscopic repair without a mesh. *Chir Ital* 2005;**57**(2):243–6.
4. Bairagi A, Moodley SR, Hardcastle TC, Muckart DJ. Blunt rupture of the right hemidiaphragm with herniation of the right colon and right lobe of the liver. *J Emerg Trauma Shock* 2010;**3**:70–2.
5. Meyers BF, McCabe CJ. Traumatic diaphragmatic hernia. Occult marker of serious injury. *Ann Surg* 1993;**218**(6):783–90.
6. Estrera Aaron S, Platt R, Mills Lawrence J. Traumatic injuries of the diaphragm. *Chest* 1979;**75**(3):306–13.
7. Wise L, Connors J, Hwang Y, Anderson C. Traumatic injuries to the diaphragm. *J Trauma* 1973;**13**:946.
8. Ebert PA, Gaertner RA, Zuidema GD. Traumatic diaphragmatic hernia. *Surg Gynecol Obstet* 1967;**125**:59.
9. Orringer MB, Kirsh MM, Sloan H. Congenital and traumatic diaphragmatic hernias exclusive of the hiatus. *Curr Probl Surg* 1975 March:33–64.
10. Kirsh MM, Sloan H. *Blunt chest trauma*. Boston: Little, Brown; 1977.
11. Iochum S, Ludig T, Walter F, Sebbag H, Grosdidier G, Blum A. Imaging of diaphragmatic injury: a diagnostic challenge. *RadioGraphics* 2002;**22**:S103–18.